WATER RESOURCES REVIEW for DECEMBER 1976

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

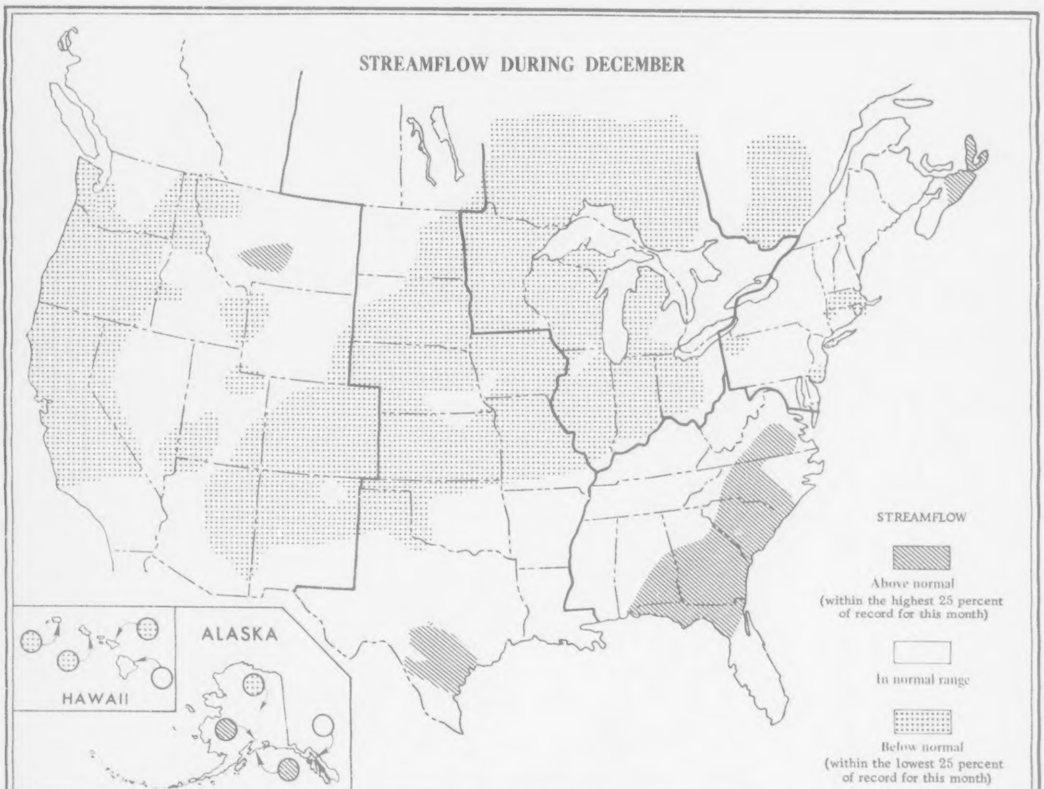
CANADA
DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES BRANCH

STREAMFLOW AND GROUND-WATER CONDITIONS

Streamflow generally decreased in large areas of southern Canada, Alaska, Hawaii, and in most of the United States north and west of the Ohio River. It increased seasonally in many Eastern and South-Central States.

Flows remained in the below-normal range in many Central and Western States and also in parts of Alaska, Hawaii, several New England States, and also Ontario and Quebec. Above-normal flows occurred in several Southeastern States as well as in parts of Montana, Nova Scotia, and Texas.

Monthly and daily mean flows were lowest of record in parts of Alaska, California, Hawaii, Michigan, Nebraska, Oregon, Utah, Washington, and Wisconsin. Record highs were observed in parts of Alaska.



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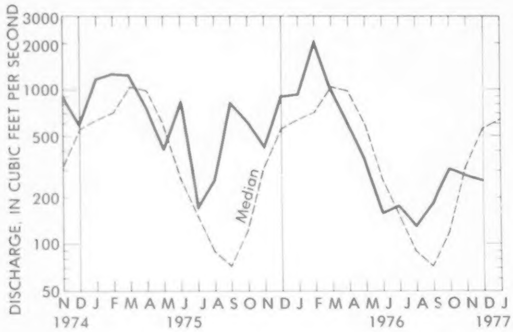
NORTHEAST

[Atlantic Provinces and Quebec; Delaware, Maryland, New York, New Jersey, Pennsylvania, and the New England States]

Streamflow generally decreased seasonally in the northern part of the region but increased in some eastern and central basins. Flows were below the normal range in parts of Quebec, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania. Some daily mean discharges were lowest of record in parts of Massachusetts. Above-normal flows persisted in parts of Nova Scotia.

In Pennsylvania, flow of Oil Creek at Rouseville decreased contraseasonally to 46 percent of the median flow for December and was in the below-normal range for the first time since June 1976. (See graph.) Monthly mean discharges at the remaining index stations in the State were in the normal range.



Monthly mean discharge of Oil Creek at Rouseville, Pa. (Drainage area, 300 sq mi; 777 sq km)

In Delaware, Maryland, and New Jersey, streamflow generally increased seasonally and was in the normal range except for flow at the index station, Great Egg Harbor River at Folsom, N.J., which increased seasonally to 78 percent of median but was in the below-normal range.

Similarly, in New York, monthly mean discharges were generally in the normal range except at the index station, Massapequa Creek at Massapequa, on Long Island, where flow increased seasonally but remained in the below-normal range for the 2d consecutive month.

In Connecticut, streamflow was in the normal range except in the northwestern part of the State, where flow at the index station, Burlington Brook near Burlington, increased seasonally but was in the below-normal range.

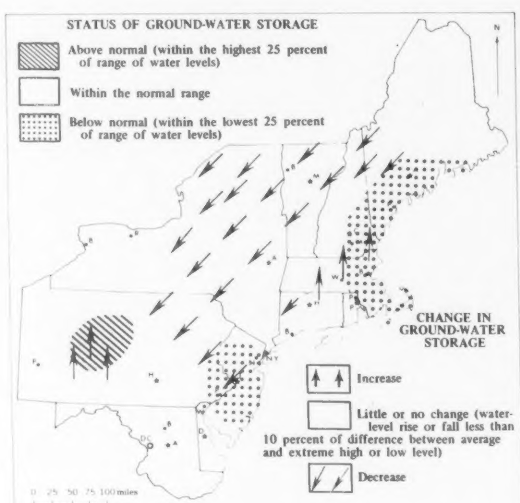
In Rhode Island, monthly mean flow at Branch River at Forestdale increased seasonally but remained in the below-normal range for the 2d consecutive month.

Similarly, in Massachusetts, streamflow at the index station, Ware River at Coldbrook (drainage area, 96.8 square miles), increased seasonally to 34 percent of median and was in the below-normal range for the 2d consecutive month. The daily mean discharge of 9.7 cfs on December 6 was lowest for December for period of record that began in 1928.

North of the St. Lawrence River in Quebec, streamflow in the St. Maurice River basin as measured at Grand Mere and in the Coulonge River basin as measured near Fort-Coulonge decreased seasonally and remained in the below-normal range for the 2d consecutive month.

In eastern Nova Scotia, streamflow was in the above-normal range for the 3d consecutive month at the index station, Northeast Margaree River at Margaree Valley, and increased into that range in the St. Marys River basin as measured at Stillwater.

Ground-water levels declined in most of the central part of the region, including northeastern Pennsylvania and eastern New York State, as well as in northern Vermont and New Hampshire and western Connecticut. (See map.) Levels rose in part of central Pennsylvania and also in much of central Massachusetts and southeastern New Hampshire. Levels near end of month were within the normal range for end of December in most of the region. However, they were above average in central Pennsylvania, and below average in much of New Jersey and adjacent southeastern Pennsylvania as well as in coastal areas from central Maine southward through southeastern Massachusetts.



Map shows ground-water storage near end of December and change in ground-water storage from end of November to end of December.

SOUTHEAST

[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

Streamflow generally increased seasonally throughout the region but decreased in parts of Tennessee and West

Virginia. Flows remained in the above-normal range in parts of Alabama, Georgia, and South Carolina, and increased into that range in parts of Florida, North Carolina, and Virginia.

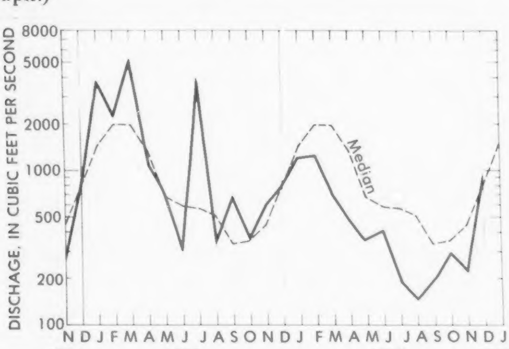
In southern Georgia, monthly mean flow of Alapaha River (tributary to Suwannee River) at Statenville increased sharply, remained above the normal range for the 3d consecutive month and was 35 times the median flow for December. In the adjacent area of Suwannee River basin in northern Florida, monthly mean discharge of Suwannee River at Branford also increased sharply into the above-normal range and was 5 times the median flow for the month.

In the Apalachicola River basin in western Georgia and the adjacent area of southeastern Alabama and northwestern Florida, monthly mean discharge as measured at Chattahoochee, Florida, increased seasonally, remained above the normal range for the 3d consecutive month, and was about 3 times median.

In extreme northwestern Florida, flow of Shoal River near Crestview continued to increase seasonally and remained in the above-normal range.

In South Carolina, monthly mean flow at the index station, Lynches River at Effingham continued to increase seasonally, was 3 times median, and remained above the normal range for the 3d consecutive month. In the Pee Dee River basin of northern South Carolina and the adjacent area of central North Carolina, monthly mean flow as measured at Peedee, South Carolina, increased sharply and also was 3 times the December median flow.

In the Yadkin River (tributary to Pee Dee River) basin in North Carolina, monthly mean discharge of South Yadkin River near Mocksville increased seasonally as a result of runoff from rains December 7 and 15 and was twice the median flow for the month. In east-central North Carolina, where monthly mean discharge of Neuse River near Clayton was below the normal range and only 51 percent of median in November, flow increased sharply in December and was greater than median. (See graph.)



Monthly mean discharge of Neuse River near Clayton, N.C. (Drainage area, 1,140 sq mi; 2,953 sq km)

In southeastern Virginia, runoff from rains early in the month caused monthly mean discharges to increase into the above-normal range in Nottaway River near Stony Creek and Slate River near Arvonia.

In the western part of the region, monthly flows at index stations in Kentucky, Mississippi, southern West Virginia, western Alabama, and eastern Tennessee increased seasonally and were in the normal range. In central and western Tennessee and northern West Virginia, monthly mean discharges decreased contraseasonally but were in the normal range.

Ground-water levels in West Virginia rose over most of the State except in a few eastern and southeastern counties; storage was above average in the western half of the State and below average elsewhere. In Kentucky, levels rose slightly in downtown Louisville and in the deep aquifers in the Jackson Purchase region in the extreme southwestern part of the State, but declined seasonally elsewhere. Levels in Virginia were higher near the end of December than last month; the level at the Matoaka Manor well near Petersburg rose nearly 1 foot to 15 ft below land surface and was a little over 1 foot above average for end of December. A new December low was reached in the key well in the "500-foot sand" near Memphis, in western Tennessee. Levels rose across the entire State of North Carolina; they were above long-term averages in the mountains and Piedmont, and below average in the Coastal Plain. In Mississippi, levels rose slightly in the Jackson area, in wells screened in the Sparta Sand. In central Alabama, the artesian pressure rose and continued above average in the index well in Montgomery; in Centreville, the pressure rose but was 0.5 foot below average near the end of the month. In Georgia, water levels in most wells in the Piedmont area rose slightly during the month but were about 2 feet lower than a year ago. In the Savannah area on the coast, levels in and near the center of pumping were about the same as November, but ranged from 3 to 5 feet lower than last year, when levels were high because of temporary reduction of industrial pumping. In the outlying area, levels were slightly higher than last month but about 2 feet lower than last year. In Bryan and Liberty Counties south of Savannah, levels were about the same as last month but about 2 feet lower than last year. In the Brunswick area still farther south, levels in and near the center of pumping ranged from about the same to 1 foot lower than last month and were about the same as last year. In the outlying areas, levels ranged from about the same to 1 foot higher than November, and about 1 foot lower than a year ago. In Florida, ground-water levels rose in the northern part of the State, but declined in the extreme northwestern part and the west-central peninsular part of the State during December. Compared to last month, levels ranged from 1.9 feet above at Tallahassee to 1.6 feet below near Tampa. End-of-month levels ranged from 4.4 feet above average at Tallahassee to 8.2 feet below average near

Mulberry in west-central Polk County. In southeastern Florida, levels declined steadily during the month, ranging from 0.1 to 0.8 foot. Levels ranged from about average to 1.6 feet below average.

WESTERN GREAT LAKES REGION

[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

Streamflow generally decreased and remained below the normal range except in parts of Illinois, Michigan, and Ohio. Flows were lowest of record for the month in parts of Michigan and Wisconsin.

In Michigan's Upper Peninsula, where monthly mean discharge of Sturgeon River near Sidnaw (drainage area, 171 square miles) was below the normal range and lowest of record for the period July–November, the monthly mean flow of 16 cfs, and the daily mean of 15 cfs on December 5 and 18 were lowest for the month in 37 years of record. In the northern part of the Lower Peninsula, monthly mean flow of Muskegon River at Evart also was below the normal range for the 4th consecutive month. In the southern part of the Lower Peninsula, flow at the index station, Red Cedar River at East Lansing, increased seasonally but was barely above the below-normal range and was less than one-half the December median flow.

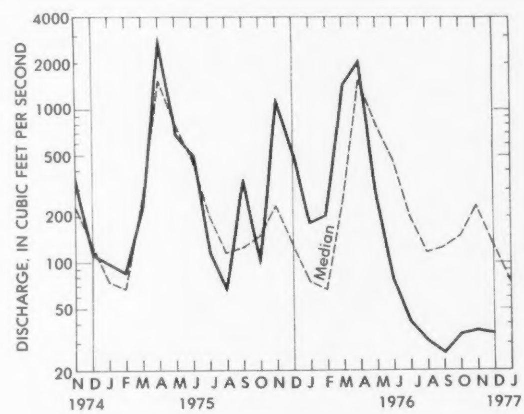
In northwestern Ohio, monthly mean flow decreased contraseasonally in Maumee River at Waterville, remained in the below-normal range, and was only 13 percent of median. In the south-central part of the State, monthly mean discharge in Scioto River at Higby also decreased contraseasonally and was below the normal range.

In northeastern Indiana, monthly mean flow in Mississinewa River at Marion decreased contraseasonally, remained in the below-normal range, and was only 18 percent of median. In the Wabash River basin in west-central Indiana and the adjacent area of eastern Illinois, monthly mean discharge, as measured at Mount Carmel, Illinois, also decreased contraseasonally, was below the normal range, and was only 26 percent of median. Similarly, in southeastern Indiana, monthly mean flow in East Fork White River at Shoals decreased contraseasonally, was in the below-normal range and only 24 percent of median. Discharge of streams draining areas of less than about 50 square miles was at or near zero at monthend. State-wide precipitation in December was reported to be generally less than one-half inch.

In east-central Illinois, flow in Sangamon River at Monticello decreased contraseasonally, remained below the normal range, and was only 4 percent of the December median flow. In the northwestern part of the State, monthly mean flow of Pecatonica River at Freeport decreased and remained below the normal range for the 7th consecutive month.

In Minnesota, streamflow continued in the below-normal range for the 8th consecutive month in Mississippi River at St. Paul, Buffalo River near Dilworth, and Crow River at Rockford, and for the 9th consecutive month at the index station, Minnesota River near Jordan. Flows were in the normal range in the southeastern part of the State. Below-normal precipitation reportedly continued through December, and temperatures generally were reported to be about 5 degrees (F) below normal during the month.

In Wisconsin, streamflow remained in the below-normal range in all parts of the State. In the northwest corner, the monthly mean discharge of 34.8 cfs in Jump River at Sheldon (drainage area, 574 square miles) was only 0.1 cfs greater than the minimum December monthly mean in record that began in July 1915. (See graph.) In the northeast corner, monthly mean flow in



Monthly mean discharge of Jump River at Sheldon, Wis. (Drainage area, 574 sq mi; 1,487 sq km)

Oconto River near Gillett (drainage area, 678 square miles) continued to decrease seasonally and remained below the normal range for the 7th consecutive month. The monthly mean discharge of 243 cfs was near the record low of 237 cfs which occurred in December 1933. In the east-central part of the State, monthly mean discharge of Fox River at Rapide Croche Dam, near Wrightstown, decreased contraseasonally and also remained in the below-normal range for the 7th consecutive month. In west-central Wisconsin, the monthly mean discharge of 2,832 cfs in Wisconsin River at Muscoda (drainage area, 10,300 square miles) was lowest for December since records began in October 1913.

(Continued on page 6.)

SELECTED DATA FOR THE GREAT LAKES, GREAT SALT LAKE, AND OTHER HYDROLOGIC SITES

GREAT LAKES LEVELS

Water levels are expressed as elevations in feet above International Great Lakes Datum 1955

(Data furnished by National Ocean Survey, NOAA, via U.S. Army Corps of Engineers office in Detroit. To convert data to elevations above mean sea level datum of 1929, add the following values: Superior, 0.96; Michigan-Huron, 1.20; St. Clair, 1.24; Erie, 1.57; Ontario, 1.22.)

Lake	December 31, 1976	Monthly mean, December		December		
		1976	1975	Average 1900–75	Maximum (year)	Minimum (year)
Superior (Marquette, Mich.)	599.80	599.97	601.13	600.60	601.53 (1974)	598.94 (1925)
Michigan and Huron (Harbor Beach, Mich.)	578.20	578.43	579.42	577.88	579.97 (1973)	575.40 (1964)
St. Clair (St. Clair Shores, Mich.)	573.65	573.89	574.74	572.93	575.21 (1972)	571.05 (1925)
Erie (Cleveland, Ohio)	570.65	570.79	571.69	569.78	572.35 (1972)	567.53 (1934)
Ontario (Oswego, N.Y.)	244.05	244.05	244.10	243.98	246.19 (1945)	241.48 (1934)

GREAT SALT LAKE

Alltime high: 4,211.6 (1873). Alltime low: 4,191.35 (October 1963).	December 31, 1976	December 31, 1975	Reference period 1904–75		
			December average, 1904–75	December maximum (year)	December minimum (year)
Elevation in feet above mean sea level:	4,200.45	4,200.60	4,197.8	4,204.2 (1923)	4,191.85 (1963)

LAKE CHAMPLAIN, AT ROUSES POINT, N.Y.

Alltime high (1827–1975): 102.1 (1869). Alltime low (1939–1975): 92.17 (1941).	December 31, 1976	December 31, 1975	Reference period 1939–75		
			December average, 1939–75	December max. daily (year)	December min. daily (year)
Elevation in feet above mean sea level:	95.70	96.49	95.11	98.30 (1974)	93.25 (1954)

FLORIDA

Site	December 1976		November 1976	December 1975
	Discharge, in cfs	Percent of normal	Discharge, in cfs	Discharge, in cfs
Silver Springs near Ocala (northern Florida)	705	84	760	687
Miami Canal at Miami (southeastern Florida)	216	121	290	133
Tamiami Canal outlets, 40-mile bend to Monroe	35	61	62	26.8

(Continued from page 4.)

Flow at this site decreased seasonally in December and remained below the normal range for the 7th consecutive month. In the north-central part of the State, the monthly mean discharge of 1,203 cfs was lowest for the month since 1896 in Chippewa River at Chippewa Falls (drainage area, 5,600 square miles). Flow at this site also decreased seasonally in December, and continued in the below-normal range for the 8th consecutive month.

In southwestern Ontario, monthly mean discharge in English River at Umfreville remained in the below-normal range for the 7th consecutive month and was 41 percent of the December median flow. In the eastern part of the Province, monthly mean flow in Missinaibi River at Mattice continued below the normal range for the 8th consecutive month and was only 16 percent of median. In southeastern Ontario, streamflow increased seasonally but was less than median for the first time since June 1976 at the index station, Saugeen River near Port Elgin.

Ground-water levels in shallow water-table wells in Minnesota declined and continued below average. The level in the key well near Hanska in Brown County, in south-central Minnesota, was the lowest for December in more than 30 years of record. In the Minneapolis-St. Paul area, artesian levels in wells tapping the Prairie du Chien-Jordan aquifer remained about the same as last month, and continued to rise in the deeper Mt. Simon-Hinckley aquifer; artesian levels in both aquifers were below average. In Wisconsin, levels declined seasonally and in general were slightly below average for December. In Michigan, levels declined in most areas, and were generally below average in all but the southern part of the Lower Peninsula, where they were near average. In the western part of the Upper Peninsula, levels declined in most home and farm wells and in some community wells; many shallow wells have gone dry. The level at Bessemer reached a critical stage. These problems have resulted from little or no recharge brought about by an extended drought that began last summer. In Illinois, the level in the shallow well at Princeton declined for the second consecutive month, following a general trend which began in May 1976. Levels in Indiana declined as a result of below-normal precipitation, although the rate of decline was slowed by cold temperatures and frozen ground. Water levels in central Ohio rose less than a foot, and declined slightly in the northeast; they remained about average in both areas.

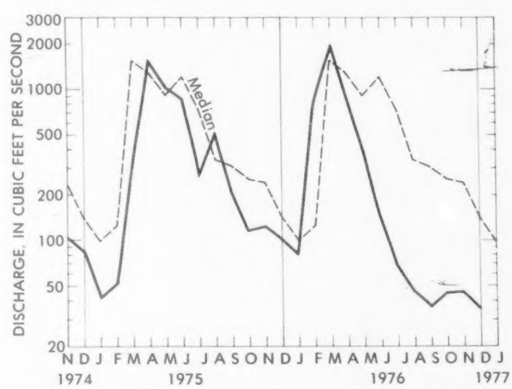
MIDCONTINENT

[Manitoba and Saskatchewan; Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

Streamflow generally decreased seasonally and remained in the below-normal range in the central and northern States of the region. Flows were variable and less than median in the Canadian Provinces. Streamflow generally increased and was in the normal range in the southern States.

In North Dakota, snow cover near the end of the month was less than that of the same period in the past several years and agricultural drought conditions were reportedly persisting. In the eastern part of the State, the monthly mean flow of 206 cfs in Red River of the North at Grand Forks (drainage area, 30,100 square miles), was lowest for any month since January 1962, and lowest for December since 1938. In western North Dakota, monthly mean discharge of Cannonball River at Breien remained in the normal range and was 45 percent of median. In the northwestern part of the State, the yearend elevation of Lake Sakakawea (mainstem reservoir on Missouri River) was the lowest since 1966.

In Big Sioux River basin in southeastern South Dakota and the adjacent areas of Minnesota and Iowa, the monthly mean discharge of 34.7 cfs as measured at Akron, Iowa (drainage area, 9,030 square miles) was only 24 percent of median and near the minimum December monthly mean flow of 32.5 cfs that occurred in December 1958. (See graph.) In the central part of



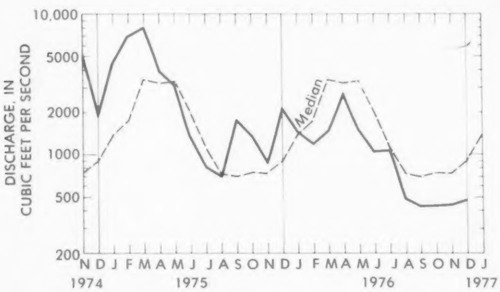
Monthly mean discharge of Big Sioux River at Akron, Iowa (Drainage area, 9,030 sq mi; 23,390 sq km)

the State, flow at the index station, Bad River near Fort Pierre, ceased on June 7, 1976 and had not resumed at the end of December. Median flow for December at that site is 0.02 cfs.

In Iowa, streamflow decreased seasonally and remained below the normal range except in the southwestern part of the State, where monthly mean discharge of Nishnabotna River above Hamburg continued in the normal range but was slightly less than median. In northeastern Iowa, monthly mean flow in Cedar River at Cedar Rapids decreased seasonally and remained in the below-normal range for the 6th consecutive month. In the central part of the State, monthly mean discharge in Des Moines River at Des Moines remained below the normal range for the 6th consecutive month and was only 16 percent of the December median flow. In

northwestern Iowa, monthly mean flow in Des Moines River at Fort Dodge continued in the below-normal range for the 9th consecutive month and was one-fourth of median flow for the month.

In northwestern Missouri, monthly mean discharge in Grand River near Gallatin remained below the normal range and was only 17 percent of median, but was 3 times the minimum December monthly mean flow of record, which occurred in 1938. In south-central Missouri, monthly mean flow in Gasconade River at Jerome continued in the below-normal range for the 5th consecutive month but increased seasonally. (See graph.)



Monthly mean discharge at Gasconade River at Jerome, Mo. (Drainage area, 2,840 sq mi; 7,360 sq km)

In Nebraska, streamflow remained in the below-normal range except in the south-central part of the State, where monthly mean discharge in Little Blue River, as measured at Barnes, Kansas, increased contra-seasonally as a result of runoff from snowmelt. In northwestern Nebraska, the monthly mean discharge of 25 cfs in Niobrara River above Box Butte Reservoir (drainage area, 1,400 square miles) was lowest for December since records began in October 1946. In the northeastern part of the State, monthly mean flow in Elkhorn River at Waterloo continued in the below-normal range for the 7th consecutive month.

In southern Kansas, monthly mean discharge in Arkansas River at Arkansas City decreased seasonally, remained below the normal range for the 5th consecutive month, and was one-third of median flow for December. In the northwestern part of the State, monthly mean flow in Saline River near Russell continued in the below-normal range and was one-half of median for the month.

In Oklahoma, Arkansas, and Louisiana, monthly mean flows generally increased seasonally at the index stations and remained in the normal range.

In Texas, streamflow increased seasonally and was in the normal range except at the index station, Guadalupe River near Spring Branch, in the south-central part of the State, where monthly mean discharge continued in the above-normal range and was 4 times the December median flow.

In Manitoba, monthly mean discharge in Waterhen River below Waterhen Lake continued to decrease seasonally but remained in the normal range for the 3d consecutive month. The level of Lake Winnipeg at Gimli averaged 711.87 feet above mean sea level for the month, 1.25 feet below the long-term mean and 0.44 foot lower than the average level last month. Abnormally dry conditions persisted in Manitoba from June through December, resulting in above-average evaporation losses on Lake Winnipeg.

Ground-water levels in North Dakota were generally unchanged, and remained below normal in the west and much below normal in the east, where a new low for December was noted in the well at Wyndmere. Levels in Nebraska generally rose slightly over most of the State, and were near average at month's end except in areas of heavy municipal pumping and in areas where there had been large withdrawals in the summer for irrigation. Levels in Iowa generally declined over most of the State; only in the extreme southwest and south-central parts were water levels above average. Another new low, in 35 years of record, occurred for the third consecutive month in the shallow well in glacial drift in Linn County in east-central Iowa. Owing to low precipitation, levels throughout Kansas continued to decline; the level in the key well in Lawrence continued near the record end-of-month low. In the rice-growing area of east-central Arkansas, the water level in the shallow aquifer rose slightly, but was in the same range that has prevailed since 1955. In the industrial aquifer of central and south Arkansas––the Sparta Sand––the level in the key well at Pine Bluff fell $1^3/_4$ feet; it was 13 feet below average but $1^1/_4$ feet higher than a year ago. At El Dorado, in the same aquifer, the level rose 1 foot and was 25 feet higher than in November 1965––the lowest November level in 21 years of record. Levels rose in Louisiana in most of the aquifers in the northern, central, and southeastern parts of the State and in the New Orleans area. Levels rose also in most aquifers in the Baton Rouge area, but levels in wells tapping the "2,000-foot sand" in the heavily pumped industrial area generally declined. Levels in the Chicot aquifer of southwestern Louisiana rose in the rice irrigation area, but declined in the Lake Charles industrial area. In Texas, levels in key observation wells were above average in the Edwards Limestone at Austin and San Antonio, but below average in the bolson deposits at El Paso. Levels rose at San Antonio and El Paso, but declined at Austin. A new December high was recorded at San Antonio, and a new December low at El Paso. A new alltime low occurred in the Ogallala Formation at Plainview.

WEST

[Alberta and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

Streamflow generally decreased throughout the region but increased in parts of Arizona, Montana, and

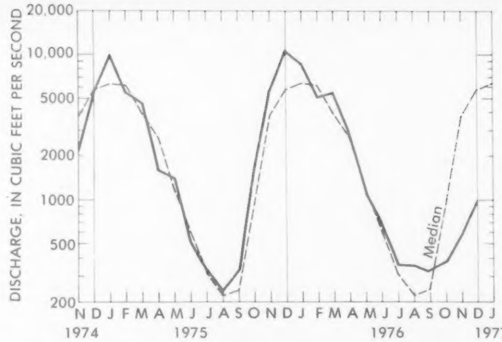
Washington. Flows remained in the below-normal range in parts of Arizona, California, Colorado, Idaho, Montana, Oregon, Utah, and Washington, and decreased into that range in parts of New Mexico. Monthly mean flows were lowest of record in parts of California, Oregon, Utah, and Washington.

In California, streamflow decreased contraseasonally at all index stations in the State and was generally in the below-normal range. In California's north coastal area, monthly mean discharge at Smith River near Crescent City (drainage area, 609 square miles), decreased to 265 cfs and only 4 percent of median. The new minimum monthly mean discharge at Crescent City was less than half the former minimum (occurred in 1937) for period of record that began in 1931. Similarly, runoff from the northern part of the Sierra Nevada as shown by the index station, North Fork American River at North Fork Dam (drainage area, 342 square miles), was only 8 percent of median. The December monthly mean discharge of 33.1 cfs and the daily mean of 29 cfs on December 28 were the lowest in 67 years of record. The remaining index stations in California had mean flows that were less than 50 percent of median and illustrate the severity of the drought which was reported as the worst in almost 100 years. Contents of major reservoirs in northern California were 68 percent of average and 62 percent of a year ago.

In Oregon, streamflow decreased contraseasonally at all index stations and remained in the below-normal range. The December monthly mean discharge of 1,297 cfs (9 percent of median) at Umpqua River near Elkton (drainage area, 3,683 square miles) was lowest in 71 years of record. Similarly, the December monthly mean flow of 327 cfs (13 percent of median) in Wilson River near Tillamook (drainage area, 161 square miles) was lowest in 46 years of record. Other index stations in Oregon had mean flows that were generally less than 30 percent of median.

Streamflow in southwestern Washington on both sides of the Cascade Range was in the below-normal range. The December monthly mean discharge of 981 cfs (17 percent of median) at Chehalis River near Grand Mound was lowest in 48 years of record and in the below-normal range for the 3d consecutive month. (See graph.) In eastern Washington, flows were generally in the normal range except at Spokane River at Spokane where monthly mean discharge remained in the below-normal range. The low flows in western Washington were the result of much below-normal precipitation that was reported as the lowest of record for December.

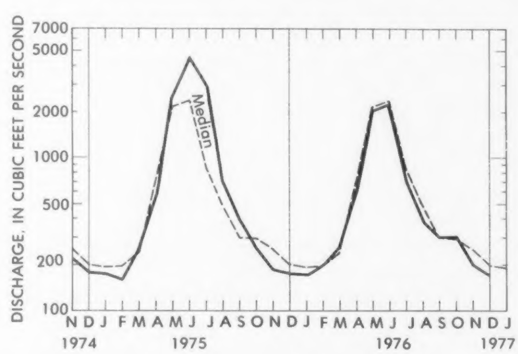
In Idaho, monthly mean flow at the index station, Snake River near Heise, remained in the below-normal range for the 2d consecutive month. Mean flows in the Boise, Coeur d'Alene, and Clearwater Rivers were also in the below-normal range as a result of the extremely dry conditions that continued through December.



Monthly mean discharge of Chehalis River near Grand Mound, Wash. (Drainage area, 895 sq mi; 2,318 sq km)

In Montana, streamflow generally decreased seasonally and was in the normal range except at Middle Fork Flathead River near West Glacier where flows remained in the below-normal range for the 3d consecutive month and at Yellowstone River at Billings where monthly mean discharge was in the above-normal range.

In Colorado, mean flows generally decreased seasonally and were below the normal range at all index stations in the State. Monthly mean discharge at Animas River at Durango continued in the below-normal range for the 2d consecutive month. (See graph.)



Monthly mean discharge of Animas River at Durango, Colo. (Drainage area, 692 sq mi; 1,792 sq km)

In New Mexico, monthly mean discharge was in the normal range except in the Rio Grande and Upper Pecos River basins where flows were in the below-normal range. In southwestern New Mexico and the adjacent area of Arizona, flow of Gila River at head of Safford Valley, near Solomon, Ariz., was 67 percent of median and below the normal range. Elsewhere in Arizona, monthly mean discharges at Little Colorado River near Cameron and Salt River near Roosevelt remained in the below-normal range for the 2d consecutive month. Also, in northwestern Arizona, flow of Virgin River at Littlefield (drainage area, 5,090 square miles), increased seasonally but remained in the below-normal range for the

2d consecutive month and the daily mean of 96 cfs, on December 21, was lowest for December in 47 years of record.

In Utah, streamflow decreased seasonally and was below median throughout the State and in the below-normal range at all index stations except at Big Cottonwood Creek near Salt Lake City and Green River at Green River. In southwestern Utah, monthly mean discharge at the index station, Beaver River near Beaver (drainage area, 90.7 square miles), remained in the below-normal range for the 10th consecutive month. Record low monthly mean discharges occurred at this station during the previous 2 months and the December monthly mean flow of 10.5 cfs and the daily mean of 7.3 cfs on December 25 were lowest for any month during the 62-year period of record.

Contents of major reservoirs in the Colorado-Big Thompson project in Colorado were below normal. Contents of the Colorado River Storage Project decreased 488,710 acre-feet during the month.

Ground-water levels in Washington generally declined during the month; levels were below average and below those of last year. In Idaho, the level in the well in the sand and gravel aquifer near Boise declined 1 foot and was slightly below average at month's end. Although the level in the well at Gooding in central Snake River Plain declined $1^1/2$ feet by mid-December, it was then slightly above average. The level in the well at Eden declined nearly a foot by mid-December but was a little more than a foot above average; levels in other wells in the Snake River Group fluctuated little. The level in the alluvial aquifer in Rathdrum Prairie in northern Idaho continued above average. In Montana, levels generally declined but were about average. However, the observation well in terrace gravel at Stevensville declined $2^1/2$ feet, was more than 7 feet below average, and reached a new December low in 20 years of record. In southern California, the level in the observation well in the Los Alamitos area in Orange County rose $2^1/2$ feet, but was nearly 21 feet below average; levels in other wells declined and continued below average. Among the key wells in Nevada, levels rose but with a new record low for December in Las Vegas Valley; fell but were above average in Paradise Valley; rose with a new December high at Steptoe; and fell with a new alltime low in Truckee Meadows. In Utah, levels generally declined in the Logan, Holladay, and Blanding areas, reaching a new December low in the Holladay area. Levels rose but remained below average in the Flowell area; levels in the Holladay area remained below average, while those in the Logan and Blanding areas were above average at month's end. In Arizona, levels rose in five index wells and fell in one index well during December. New December lows were measured at the Avra Valley, Tucson, and Elfrida wells; a new December high occurred in the Nogales well. Levels in New Mexico rose in all index wells except in the shallow aquifer in the Roswell basin, in which levels declined slightly. Levels continued below average in all index wells.

ALASKA

Streamflow continued to decrease seasonally throughout the State, and was above the normal range in south-central Alaska owing to abnormally high rainfall early in the month and continued mild temperatures. The monthly mean discharge of 2,911 cfs and the daily mean of 5,940 cfs on December 1 at Kenai River at Cooper Landing (drainage area, 634 square miles) were highest in 29 years of record. In contrast, streamflow in central Alaska was far below normal despite above-normal temperatures. The monthly mean discharge of 194 cfs and the daily mean of 170 cfs on December 24 at Chena River at Fairbanks (drainage area, 1,980 square miles) were lowest for December in 28 years of record, and remained in the below-normal range for the 7th consecutive month. Similarly, the monthly and daily mean discharges at Tanana River at Nenana were lowest for December in 14 years of record.

Ground-water levels in wells tapping confined aquifers in the Anchorage area generally rose 3 to 5 feet north and east of the city center and fell 1 to 5 feet south of the city center. The water level of the alluvial aquifers rose about 1 foot during December.

HAWAII

Streamflow decreased contraseasonally at all index stations in the State and was below the normal range except at Waiakea Stream near Mountain View on the island of Hawaii where flow was in the normal range. On the island of Oahu, the monthly mean discharge of 0.81 cfs, and daily mean discharge of 0.36 cfs on December 24–26, in Kalihi Stream near Honolulu (drainage area, 2.61 square miles) were lowest for December since records began in 1913.

METRIC EQUIVALENTS OF UNITS USED IN THE WATER RESOURCES REVIEW

(Round-number conversions, to nearest four significant figures)

1 foot = 0.3048 meter   1 mile = 1.609 kilometers
1 acre = 0.4047 hectare = 4,047 square meters
1 square mile (sq mi) = 259 hectares = 2.59 square kilometers (sq km)
1 acre-foot (ac-ft) = 1,233 cubic meters
1 million cubic feet (mcf) = 28,320 cubic meters
1 cubic foot per second (cfs) = 0.02832 cubic meters per second = 1.699 cubic meters per minute
1 second-foot-day (cfsd) = 2,447 cubic meters
1 million gallons (mg) = 3,785 cubic meters = 3.785 million liters
1 million gallons per day (mgd) = 694.4 gallons per minute (gpm) = 2.629 cubic meters per minute = 3,785 cubic meters per day

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF DECEMBER 1976

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of Nov. 1976	End of Dec. 1976	End of Dec. 1975	Average for end of Dec.	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	52	51	54	48	226,300 (a)
QUEBEC					
Allard (P)	83	76	84	87	280,600 ac-ft
Gouin (P)	81	75	83	97	6,954,000 ac-ft
MAINE					
Seven reservoir systems (MP)	86	81	55	55	178,500 mcf
NEW HAMPSHIRE					
First Connecticut Lake (P)	74	62	45	60	3,330 mcf
Lake Francis (FPR)	75	65	82	69	4,326 mcf
Lake Winnipesaukee (PR)	76	76	69	60	7,200 mcf
VERMONT					
Harriman (P)	64	60	46	59	5,060 mcf
Somerset (P)	77	68	84	66	2,500 mcf
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	72	70	75	72	3,394 mcf
NEW YORK					
Great Sacandaga Lake (FPR)	68	53	47	53	34,270 mcf
Indian Lake (FMP)	90	71	74	60	4,500 mcf
New York City reservoir system (MW)	92	89	91	......	547,500 mg
NEW JERSEY					
Wanaque (M)	85	84	101	73	27,730 mg
PENNSYLVANIA					
Allegheny (FPR)	28	23	30	31	51,400 mcf
Pymatuning (FMR)	81	71	84	80	8,191 mcf
Raystown Lake (FR)	62	62	58	31	33,190 mcf
Lake Wallenpaupack (PR)	68	66	69	55	6,875 mcf
MARYLAND					
Baltimore municipal system (M)	97	96	100	84	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	80	80	80	75	12,580 mcf
Narrows (Badin Lake) (P)	98	99	98	94	5,617 mcf
High Rock Lake (P)	64	72	54	63	10,230 mcf
SOUTH CAROLINA					
Lake Murray (P)	82	82	69	57	70,300 mcf
Lakes Marion and Moultrie (P)	82	104	59	58	81,100 mcf
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	73	64	62	50	75,360 mcf
GEORGIA					
Burton (PR)	77	64	61	49	104,000 ac-ft
Sinclair (MPR)	89	86	69	70	214,000 ac-ft
Lake Sidney Lanier (FMPR)	54	56	61	50	1,686,000 ac-ft
ALABAMA					
Lake Martin (P)	78	74	71	57	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	34	35	30	30	1,156,000 cfsd
Douglas Lake (FPR)	21	11	13	10	703,100 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	41	41	42	36	510,300 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	44	41	34	29	1,452,000 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	26	36	38	36	745,200 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	63	57	87	60	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	19	15	69	51	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	10	10	22	24	1,640,000 ac-ft
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	87	83	87	......	22,640,000 ac-ft
SOUTH DAKOTA					
Angostura (I)	61	62	63	74	127,600 ac-ft
Bell Fourche (I)	19	25	41	44	185,200 ac-ft
Lake Francis Case (FIP)	53	55	57	56	4,834,000 ac-ft
Lake Oahe (FIP)	81	80	82	......	22,530,000 ac-ft
MIDCONTINENT REGION—Continued					
SOUTH DAKOTA--Continued					
Lake Sharpe (FIP)	102	103	102	92	1,725,000 ac-ft
Lewis and Clarke Lake (FIP)	92	99	98	91	477,000 ac-ft
NEBRASKA					
Lake McConaughy (IP)	68	70	75	70	1,948,000 ac-ft
OKLAHOMA					
Eufaula (FPR)	68	65	78	82	2,378,000 ac-ft
Keystone (FPR)	66	65	75	97	661,000 ac-ft
Tenkiller Ferry (FPR)	75	74	105	90	628,200 ac-ft
Lake Altus (FIMR)	55	55	91	48	134,500 ac-ft
Lake O'The Cherokees (FPR)	73	70	81	79	1,492,000 ac-ft
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	89	83	89	90	2,722,000 ac-ft
TEXAS					
Bridgeport (IMW)	91	91	88	42	386,400 ac-ft
Canyon (FMR)	99	99	94	65	385,600 ac-ft
International Amistad (FIMPW)	104	107	100	73	3,497,000 ac-ft
International Falcon (FIMPW)	100	100	98	75	2,667,000 ac-ft
Livingston (IMW)	100	100	100	71	1,788,000 ac-ft
Possum Kingdom (IMPRW)	94	92	92	99	569,400 ac-ft
Red Bluff (PI)	21	21	36	30	307,000 ac-ft
Toledo Bend (P)	81	86	87	77	4,472,000 ac-ft
Twin Buttes (FIM)	97	99	97	17	177,800 ac-ft
Lake Kemp (IMW)	78	77	81	88	268,000 ac-ft
Lake Meredith (FMW)	40	39	44	38	821,300 ac-ft
Lake Travis (FIMPRW)	99	98	92	76	1,144,000 ac-ft
THE WEST					
WASHINGTON					
Ross (PR)	86	67	86	67	1,052,000 ac-ft
Franklin D. Roosevelt Lake (IP)	89	96	100	89	5,232,000 ac-ft
Lake Chelan (PR)	65	51	88	55	676,100 ac-ft
Lake Cushman	71	68	97	85	359,500 ac-ft
Lake Merwin (P)	105	88	97	95	246,000 ac-ft
IDAHO					
Boise River (4 reservoirs) (FIP)	58	60	67	58	1,235,000 ac-ft
Coeur d'Alene Lake (P)	36	29	79	55	238,500 ac-ft
Pend Oreille Lake (FP)	32	35	52	52	1,561,000 ac-ft
IDAHO--WYOMING					
Upper Snake River (8 reservoirs) (MP)	62	65	70	62	4,401,000 ac-ft
WYOMING					
Boysen (FIP)	89	81	83	74	802,000 ac-ft
Buffalo Bill (IP)	66	59	66	68	421,300 ac-ft
Keyhole (F)	65	66	67	39	199,900 ac-ft
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	56	57	62	44	3,056,000 ac-ft
COLORADO					
John Martin (FIR)	1	1	2	15	364,400 ac-ft
Taylor Park (IR)	60	59	62	53	106,200 ac-ft
Colorado–Big Thompson project (I)	48	49	69	56	722,600 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Navajo, and Blue Mesa Reservoirs (IFPR)	76	75	81	.....	31,280,000 ac-ft
UTAH--IDAHO					
Bear Lake (IPR)	77	75	77	56	1,421,000 ac-ft
CALIFORNIA					
Folsom (FIP)	40	32	58	52	1,000,000 ac-ft
Hetch Hetchy (MP)	22	16	48	35	360,400 ac-ft
Isabella (FIR)	12	12	31	24	551,800 ac-ft
Pine Flat (FI)	24	25	47	44	1,014,000 ac-ft
Clair Engle Lake (Lewiston) (P)	51	50	77	77	2,438,000 ac-ft
Lake Almanor (P)	56	56	72	45	1,036,000 ac-ft
Lake Berryessa (FIMW)	63	75	85	79	1,600,000 ac-ft
Millerton Lake (FI)	46	48	63	53	503,200 ac-ft
Shasta Lake (FIPR)	36	37	70	68	4,377,000 ac-ft
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	33	25	71	49	744,600 ac-ft
NEVADA					
Rye Patch (I)	63	64	90	77	157,200 ac-ft
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	81	82	77	66	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	0	0	12	13	1,073,000 ac-ft
Salt and Verde River system (IMPR)	48	45	50	36	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	24	23	23	75	352,600 ac-ft
Elephant Butte and Caballo (FIPR)	15	17	24	27	2,539,000 ac-ft

[a]Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR DECEMBER AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	December data of following calendar years	Stream discharge during month: Mean (cfs)	Dissolved-solids concentration during month[a]: Minimum (mg/L)	Dissolved-solids concentration during month[a]: Maximum (mg/L)	Dissolved-solids discharge during month[a] (tons per day): Mean	Dissolved-solids discharge during month[a] (tons per day): Minimum	Dissolved-solids discharge during month[a] (tons per day): Maximum	Water temperature during month[b]: Mean, in °C	Water temperature during month[b]: Minimum, in °C	Water temperature during month[b]: Maximum, in °C
	NORTHEAST										
01463500	Delaware River at	1976	7,930	80	101	1,680	1,180	4,200	2.5	1.0	8.5
	Trenton, N.J.										
	(Morrisville, Pa.)	1944–75	13,380	65	130	......	631	20,500	......	0	11.0
				(Dec. 15–20,1949)	(Dec. 27, 1975)	......	(Dec. 3, 1964)	(Dec. 22, 1973)			
			[10,750[c]]								
04264331	St. Lawrence River at	1976	239,000	165	167	107,000	92,000	128,000	1.0	0.5	4.0
	Cornwall, Ontario, near	1975	261,600	167	170	118,000	103,000	128,000	3.5	0.5	7.0
	Massena, N.Y. (streamflow	1966–75	256,500	....	....	......	....	....	3.0	0	8.0
	station formerly at		[229,500[c]]								
	Ogdensburg, N.Y.)										
	SOUTHEAST										
07289000	Mississippi River at	1976	285,500	212	243	173,000	131,000	208,000	5.5	4.5	6.5
	Vicksburg, Miss	1975	538,800	190	209	290,000	237,000	343,000	8.5	6.0	10.5
			[365,200[c]]								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam	1976	185,000	157	247	......	70,400	179,000	......	4.5	6.5
	53, near Grand Chain, Ill.										
	(25 miles west of Paducah,	1954–75	288.900	133	362	......	26,200	432,000	......	0	14.0
	Ky.; streamflow station			(Dec. 20, 1962)	(Dec. 15, 1969)	......	(Dec. 20, 1955)	(Dec. 29, 1958)			
	at Metropolis, Ill.)		[173,000[c]]								
	MIDCONTINENT										
06934500	Missouri River at Hermann,	1976	36,200	418	486	43,900	35.000	58,900	1.0	0	3.5
	Mo. (60 miles west of St.	1975	68,300	313	471	71,500	49,600	133,000	4.5	3.0	6.0
	Louis, Mo.)		[29,940[c]]								
	WEST										
14128910	Columbia River at	1976	130,800	99	107	36,500	23,300	45,800	8.5	7.5	9.5
	Warrendale, Oreg.	1975	192,800	82	100	49,400	31,900	66,500	9.0	7.5	10.5
	(30 miles east of Portland,	1967–75	147,400	....	....	......	....	....	......	2.5	9.0
	Oreg.; streamflow station		[112,800[c]]								
	at The Dalles, Oreg.)										

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X °C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1941–70, for comparison with data for current month.

FLOW OF LARGE RIVERS DURING DECEMBER 1976

Station number*	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1970 (cfs)	December 1976					
				Monthly discharge (cfs)	Percent of median monthly discharge, 1941–70	Change in discharge from previous month (percent)	Discharge near end of month		
							(cfs)	(mgd)	Date
1–0140	St. John River below Fish River at Fort Kent, Maine.	5,690	9,397	4,419	100	-60	2,900	1,870	31
1–3185	Hudson River at Hadley, N.Y	1,664	2,791	2,224	99	-33	1,700	1,100	31
1–3575	Mohawk River at Cohoes, N.Y	3,456	5,450	5,290	94	-3	....	....	......
1–4635	Delaware River at Trenton, N.J	6,780	11,360	8,213	76	-26	6,980	4,510	22
1–5705	Susquehanna River at Harrisburg, Pa.	24,100	33,670	21,900	75	-34	18,000	11,600	31
1–6465	Potomac River near Washington, D.C.	11,560	[1]10,640	10,470	130	-7	6,630	4,290	31
2–1055	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	4,847	7,556	206	+375	4,280	2,770	31
2–1310	Pee Dee River at Peedee, S.C	8,830	9,098	21,300	309	+209	17,600	11,400	28
2–2260	Altamaha River at Doctortown, Ga.	13,600	13,380	33,426	462	+278	33,800	21,800	28
2–3205	Suwannee River at Branford, Fla	7,740	6,775	16,900	493	+228	19,300	12,500	31
2–3580	Apalachicola River at Chattahoochee, Fla.	17,200	21,690	41,600	257	+125	51,000	33,000	30
2–4670	Tombigbee River at Demopolis lock and dam near Coatopa, Ala.	15,400	21,700	19,740	109	+326	38,100	24,600	27
2–4895	Pearl River near Bogalusa, La	6,630	8,533	5,568	116	+125	8,750	5,660	31
3–0495	Allegheny River at Natrona, Pa	11,410	[1]18,700	14,510	75	+1	1,600	1,030	25
3–0850	Monongahela River at Braddock, Pa.	7,337	[1]11,950	12,170	88	+21	6,900	4,460	25
3–1930	Kanawha River at Kanawha Falls, W.Va.	8,367	12,370	13,610	104	+29	5,480	3,540	26
3–2345	Scioto River at Higby, Ohio	5,131	4,337	1,037	64	-33	960	620	28
3–2945	Ohio River at Louisville, Ky[2]	91,170	110,600	81,360	92	+21	52,700	34,100	27
3–3775	Wabash River at Mount Carmel, Ill.	28,600	26,310	3,828	26	-25	3,050	1,970	28
3–4690	French Broad River below Douglas Dam, Tenn.	4,543	[1]6,528	6,853	135	+121	....	....	......
4–0845	Fox River at Rapide Croche Dam, near Wrightstown, Wis.[2]	6,150	4,142	2,130	65	-5	....	....	......
02MC002 (4–2643.31)	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y.[3]	299,000	239,100	239,700	104	-19	220,000	142,000	31
050115	St. Maurice River at Grand Mere, Quebec.	16,300	24,900	7,270	57	-37	19,900	12,900	28
5–0825	Red River of the North at Grand Forks, N. Dak.	30,100	2,439	206	24	-32	180	120	31
5–3300	Minnesota River near Jordan, Minn ..	16,200	3,306	157	24	-26	165	107	28
5–3310	Mississippi River at St. Paul, Minn ...	36,800	[1]10,230	1,480	31	-14	1,330	860	27
5–3655	Chippewa River at Chippewa Falls, Wis.	5,600	5,062	1,203	42	+20	....	....	......
5–4070	Wisconsin River at Muscoda, Wis	10,300	8,457	2,832	50	-1	....	....	......
5–4465	Rock River near Joslin, Ill	9,520	5,288	2,870	94	+41	2,890	1,870	29
5–4745	Mississippi River at Keokuk, Iowa ...	119,000	61,210	16,129	47	-8	16,700	10,800	30
5–4855	Des Moines River below Raccoon River at Des Moines, Iowa.	9,879	3,796	110	16	-23	116	75	28
6–2145	Yellowstone River at Billings, Mont.	11,795	6,754	3,488	117	-11	3,450	2,230	31
6–9345	Missouri River at Hermann, Mo	528,200	78,480	36,150	121	-18	27,500	17,800	27
7–2890	Mississippi River at Vicksburg, Miss.[4]	1,144,500	552,700	285,500	78	-5	285,000	184,000	31
7–3310	Washita River near Durwood, Okla ..	7,202	1,379	261	60	+15	210	140	31
8–2765	Rio Grande below Taos Junction Bridge, near Taos, N. Mex.	9,730	732	308	67	-9	310	200	22
9–3150	Green River at Green River, Utah ...	40,600	6,369	1,721	84	-10	3,370	2,180	31
11–4255	Sacramento River at Verona, Calif ...	21,257	18,370	6,263	31	-7	5,750	3,720	29
13–2690	Snake River at Weiser, Idaho	69,200	17,670	16,600	111	+6	15,600	10,100	28
13–3170	Salmon River at White Bird, Idaho ..	13,550	11,060	4,369	100	-20	4,680	3,020	28
13–3425	Clearwater River at Spalding, Idaho ..	9,570	15,320	2,770	42	-58	7,400	4,780	28
14–1057	Columbia River at The Dalles, Oreg.[5]	237,000	194,000	130,800	116	+1	....	....	......
14–1910	Willamette River at Salem, Oreg	7,280	23,370	6,629	15	-49	6,950	4,490	27-31
15–5155	Tanana River at Nenana, Alaska	25,600	24,040	4,868	90	-44	4,600	3,000	31
8MF005	Fraser River at Hope, British Columbia.	83,800	95,300	52,300	121	-18	52,500	33,900	30

[1]Adjusted.

[2]Records furnished by Corps of Engineers.

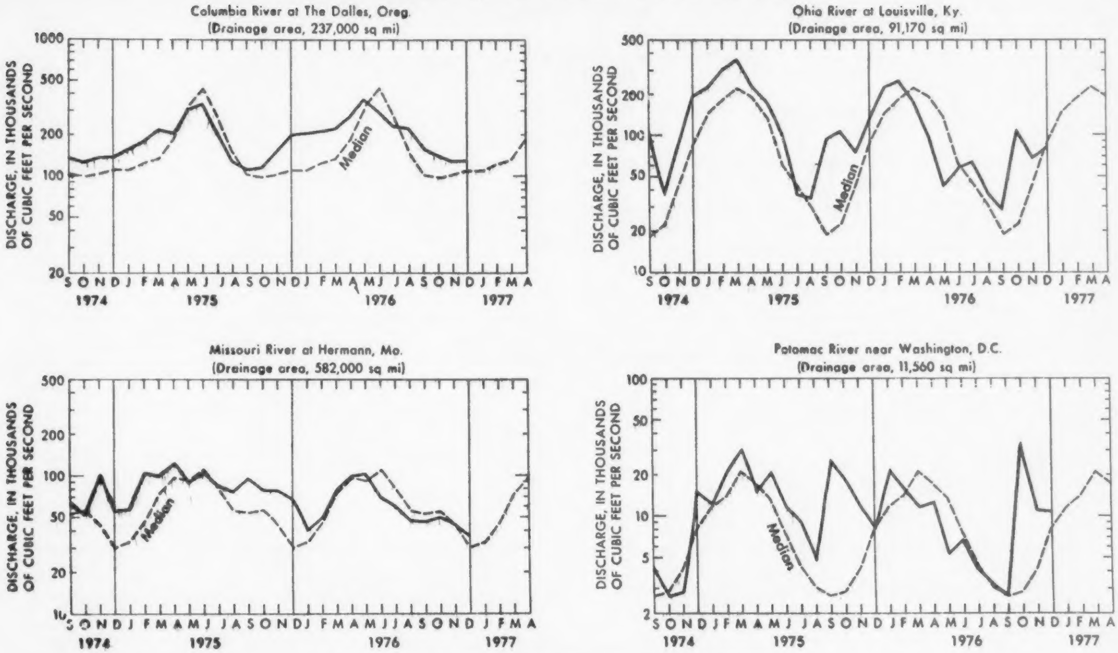
[3]Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.

[4]Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.

[5]Discharge (unadjusted) determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

*The U.S. station numbers as listed in this table are in a shortened form previously in use, and used here for simplicity of tabular and map presentation. The full, correct number contains 8 digits and no punctuation marks. For example, the correct form for station number 1–3185 is 01318500.

HYDROGRAPHS OF FOUR LARGE RIVERS



CORRECTIONS FOR NOVEMBER ISSUE---

Page 8; Drainage area of Region 10, in metric units, is about 1,400,000 sq km (*not* 850,000).

Page 9: In text at top of page, the symbol "9N" should have been shown as "9NW" in the listing of radiochemical and pesticide sampling stations, and "52N" is the correct symbol in place of "53N" in the pesticide listing.

WATER RESOURCES REVIEW

DECEMBER 1976

Based on reports from the Canadian and U.S. field offices; completed January 13, 1976

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for December based on 20 index stream-gaging stations in Canada and 130 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations which are located near the points shown by the arrows.

Streamflow for December 1976 is compared with flow for December in the 30-year reference period 1941–70. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow for December is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range.* In the Water Resources Review the median is obtained by ranking the 30 flows of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median.

The normal is an average (but not an arithmetic average) or middle value; half of the time you would expect the December flows to be below the median and half of the time to be above the median. Shorter reference periods are used for the Alaska index stations because of the limited records available.

Statements about *ground-water levels* refer to conditions near the end of December. Water level in each key observation well is compared with average level for the end of December determined from the entire past record for that well or from a 20-year reference period, 1951–70. *Changes in ground-water levels,* unless described otherwise, are from the end of November to the end of December.

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NAWDEX--THE NATIONAL WATER DATA EXCHANGE

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INTRODUCTION

Existing water data are becoming more important in matters related to the appraisal and management of available water resources, pollution surveillance and studies, monitoring of water quality criteria and standards, and the development of energy resources. The National Water Data Exchange (NAWDEX) has been established to help users of water data to locate and acquire needed data. NAWDEX is not a large depository of water data. Rather, its objective is to provide the user with sufficient information to define what data are available, where these data may be obtained, in what form the data are available, and some of the major characteristics of the data.

ORGANIZATION OF NAWDEX

NAWDEX has been organized using guidelines and design characteristics developed by the Federal Intergency Water Data Handling Work Group. This work group is comprised of representatives of 13 Federal agencies and is a task group of the Federal Interagency Advisory Committee on Water Data established under the auspices of the U.S. Geological Survey's Office of Water Data Coordination. The implementation of NAWDEX has also been endorsed by the non-Federal Advisory Committee on Water Data for Public Use.

NAWDEX Program Office: The U.S. Geological Survey has the lead-role responsibility for NAWDEX. In this capacity, it has established the NAWDEX Program Office at its National Center in Reston, Virginia. This office provides the central management for NAWDEX. It also has the responsibility for coordinating all operational activities within the program. This includes serving as liaison between NAWDEX members and users of the system.

Local Assistance Centers: The service capabilities of NAWDEX are supported by a nationwide network of Local Assistance Centers established in the offices of NAWDEX members to provide local and convenient access to NAWDEX and its services. This network initially consists of 51 Centers located in 45 States and Puerto Rico. A complete list of these Centers and their locations may be obtained from the Program Office. Most Centers are equipped with computer terminals, thereby providing an extensive telecommunication network for access to the computerized directory and indexes being developed for the NAWDEX program. As the NAWDEX membership increases, additional centers will be added in large population areas and areas of high user interest to provide improved access to NAWDEX and its services.

NAWDEX Members: Organizations that become participating members of NAWDEX form the base units of the organization. Current membership includes representation from the Federal, State, academic, and private sectors of the water-data community. Participating members work together as a confederation to provide ready and convenient access to their water data.

NAWDEX SERVICES

A variety of services are provided by NAWDEX. Those of major significance are:

Identification of Sources of Water Data: The NAWDEX Program Office maintains a *Water Data Sources Directory.* This directory identifies organizations that collect water data, locations within these organizations from which water data may be obtained, the geographic areas in which water data are collected by these organizations, the types of water data collected, alternate sources for acquiring the organization's data, and the media in which the data are available.

Nationwide Indexing of Water Data: A computerized *Master Water Data Index* is also maintained which is scheduled for nationwide use in November 1976. This index identifies individual sites for which water data are available, the locations of these sites, the organizations collecting the data, the hydrologic disciplines represented by the data, the periods of record, water data parameters, the frequency of measurement of the parameters, and the media in which the data are available. More than 61,000 water data sites are currently being indexed from information contributed by 19 Federal organizations and more than 300 non-Federal organizations. The contents of the index will grow significantly as the NAWDEX membership increases.

Data Search Assistance: Through its *Water Data Sources Directory,* its *Master Water Data Index,* and indexes and other reference sources made available by its participating members, NAWDEX assists its users in locating data of special interest. These data include water data in computerized and in both published and unpublished forms. The user is then referred to the organization(s) having the needed data. NAWDEX thus serves as a central point of contact for locating water data that may be held by several different organizations. Data search assistance may be obtained from the NAWDEX Program Office or from any of the Local Assistance Centers.

NAWDEX MEMBERSHIP

Membership in NAWDEX is voluntary and open to any water-oriented organization that wishes to take an active role in NAWDEX activities. There are no fees or dues associated with membership.

Conditions for becoming a NAWDEX member are quite flexible. However, a signed Memorandum of Understanding is required between the NAWDEX Program Office and the member organization. While the terms of this document may be negotiated, it generally requires that the member consent to being listed as a source of water data; provide sufficient input to NAWDEX to allow water data held by the member to be indexed; respond to requests for water data; and participate, to the extent possible, in the development and utilization of standardized techniques and methodologies for the handling of water data.

CHARGES FOR NAWDEX SERVICES

Users requesting data or services through NAWDEX may be required to pay charges assessed at the option of the member organization supplying the data or service. In general, charges will apply to those requests that require extensive computer usage or manpower for response. In all cases, the charge will not exceed the actual cost incurred in providing the service or product. Generally, users will not be charged for data search assistance by a NAWDEX office.

Requests for services or additional information related to the NAWDEX program may be directed to:

National Water Data Exchange
U.S. Geological Survey
421 National Center
Reston, VA 22092
Telephone (703) 860-6031,
(FTS) 928-6031.

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